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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/567,198	12/11/2006	Alexander I. Khibnik	67008-139	9499

26096 7590 04/04/2008
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EXAMINER	
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ART UNIT	PAPER NUMBER
2857	

MAIL DATE	DELIVERY MODE
04/04/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/567,198	KHIBNIK ET AL.
	Examiner	Art Unit
	MOHAMED CHARIOUI	2857

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 April 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) *1-25 and 27-31* is/are rejected.

7)☒ Claim(s) *26* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 February 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-25 and 27-31 are rejected under 35 U.S.C. 102(b) as being anticipated by Bohannan et al. (U.S. Patent Number 4,956,999).

As per claim 1, Bohannan et al. teach obtain at least one input state parameter (see col. 5, lines 20-41); obtaining at least one estimate feature of an estimated signal from said at least one input state parameter from an estimation model, wherein the estimation model maps a relationship between at least one state parameter and at least one feature; and constructing the estimated signal from said at least one estimated feature (col. 7, lines 12-32).

As per claims 2, 18 and 27, Bohannan et al. further teach that the estimated signal is at least one selected from the group consisting of an actual load and a response to a load (see col. 5, lines 20-41).

As per claim 3, Bohannan et al. further teach that the at least one estimated feature comprises at least one mode amplitude associated with at least one mode shape (i.e. structural member) (see col. 6, lines 23-40 and col. 7, lines 12-32).

As per claims 4 and 12, Bohannan et al. further teach that the at least one mode amplitude is a plurality of mode amplitudes and said at least one mode shape is a

plurality of mode shapes, and wherein the constructing step comprises synthesizing said plurality of mode amplitudes with said plurality of mode shapes to obtain the estimated signal (see col. 5, lines 9-19; col. 6, lines 15-50; and col. 7, lines 12-32).

As per claim 5, Bohannan et al. further teach that obtaining a plurality of sensor-specific signals from a plurality of sensors, and combining the plurality of signals to obtain a composite estimation model (see col. 6, lines 1-15).

As per claims 6 and 29, Bohannan et al. further teach the estimated signal from the constructing step acts as a virtual output (see col. 5, line 52 to col. 6, line 7 and col. 7, lines 27-32).

As per claims 7, 16 and 30, Bohannan et al. further teach combining the virtual sensor output with at least one physical sensor output (see col. 5, line 52 to col. 6, line 7 and col. 7, lines 27-32).

As per claim 8, Bohannan et al. further teach that the at least one estimated feature comprises a plurality of estimated features, and wherein the estimation model corresponds to a plurality of estimated signals, and wherein the method further comprises: separating the plurality of estimated features into groups, each group corresponding to one of said plurality of estimated signals; and conducting the constructing step on each group (see col. 7, lines 12-32).

As per claim 9, Bohannan et al. teach obtaining at least one input state parameter (see col. 5, lines 20-41); obtaining at least one estimated variable feature from said at least one input state parameter via an feature estimation model, wherein the feature estimation model maps relationships between at least one state parameter

and at least one variable feature (see col. 7, lines 12-45); and constructing an estimated signal from said at least one estimated variable feature and at least one fixed feature (see col. 7, lines 12-45).

As per claim 10, Bohannan et al. further teach that the at least one input state parameter corresponds to at least one system operating state (see col. 5, lines 20-32).

As per claim 11, Bohannan et al. further teach that the at least one estimated variable feature comprises at least one mode amplitude, and wherein said at least one fixed feature comprises at lest one mode shape (see col. 7, lines 12-32).

As per claims 13 and 22, Bohannan et al. further teach that the signal estimation model comprises a plurality of local signal estimation models generated by partitioning a plurality of input state parameters and said plurality of estimated variable features and generating each of said local models within each partition (see col. 7, lines 12-32).

As per claims 14 and 23, Bohannan et al. further teach that each local model corresponds to a regime having a selected range of values of state parameters (col. 7, lines 12-32).

As per claim 15, Bohannan et al. further teach that the regime is at least one of a system operating regime and a system configuration (col. 10, lines 40-68).

As per claim 17, Bohannan et al. further teach that the signal estimation model corresponds to a plurality of estimated signals, and wherein the method further comprises: separating the plurality of fixed features into groups, each group

corresponding to one of said plurality of estimated signals; and conducting the constructing step on each group using the same estimated variable features for each group and the fixed features corresponding to a given group (col. 7, lines 12-32).

As per claim 19, Bohannan et al. teach obtaining an actual signal during operation of a system, obtaining at least one state parameter during the same operation conducted for step of obtaining of the actual signal, extracting at least one fixed feature (i.e. structural signature) and at least one variable feature (i.e. frequencies or amplitudes) from the signal (see col. 6, lines 23-40); constructing a variable feature estimation model that maps said at least one variable feature by said at least one state parameter in the feature estimation model (see col. 7, lines 12-32); and constructing a synthesis model that synthesizes an estimated signal from at least one variable feature obtained using the feature estimation model and at least one fixed feature (see col. 7, lines 12-32).

As per claim 20, Bohannan et al. further teach that the at least one variable feature, comprises at least one mode amplitude, and wherein said at least one fixed feature comprises at least one mode shape (see col. 6, lines 23-40 and col. 7, lines 12-32).

As per claim 21, Bohannan et al. further teach that the at least one mode amplitude comprises a plurality of mode amplitudes and said at least one mode shape comprises a plurality of mode shapes, and wherein said plurality of mode shapes are a plurality of functions, and wherein said plurality of mode amplitudes are coefficients for

said plurality of mode shapes (see col. 6, lines 23-40 and col. 5, lines 9-19 and col. 7, lines 12-32).

As per claims 24 and 25, Bohannan et al. further teach validating the signal estimation model by: generating an estimated signal using known state parameters, and comparing the estimated signal with a signal measured during operation of the part with state parameters matching the known state parameters (col. 7, lines 12-32).

As per claim 31, Bohannan et al. further teach that the estimation model is a composite estimation model constructed from a plurality of sensor-specific load signals output by a plurality of load sensors (see col. 5, line 52 to col. 6, line 7 and col. 7, lines 27-32).

Allowable Subject Matter

2. **Claim 26** is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

The closest prior art, Bohannan et al. (U.S. Patent No. 4,956,999) fails to anticipate or render obvious a method for generating a signal estimation model including the step of obtaining a N-dimensional array from the actual signal and constructing said at least one variable feature and said at least one fixed feature from the array, where $N \geq 2$, in combination with the rest of the claim limitations as claimed and defined by the Applicant.

Prior art

3. The prior art made record and not relied upon is considered pertinent to applicant's disclosure:

Jenkinset et al. ['718] disclose method and apparatus for monitoring the operation of an electric generator.

Prigent ['741] discloses process and device to continuously and in real time control a complex manufacturing process.

Gross et al. ['872] disclose system for monitoring an industrial process and determining sensor status.

Contact information

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mohamed Charioui whose telephone number is (571) 272-2213. The examiner can normally be reached Monday through Friday, from 9 am to 6 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eliseo Ramos-Feliciano can be reached on (571) 272-7925. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mohamed Charioui

3/25/08

/Edward Raymond/

Primary Examiner, Art Unit 2857